Citation:

Skinner JD, Carruth BR. A longitudinal study of children's juice intake and growth: the juice controversy revisited.*Journal of American Dietetic Association,* 2001; 101: 432-437.

PubMed ID: 11320948

Study Design:

Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

- To determine associations between children's longitudinal juice intake and growth parameters at 72 months of age
- To determine children's beverage intake patterns over time.

Inclusion Criteria:

Exclusion Criteria:

Description of Study Protocol:

Seven in-home interviews were conducted per child when each child was between 24 and 72 months of age. Three days of dietary data were gathered for beverage intake, categorized as:

- Juice (100% juice only)
- Milk
- Carbonated beverages
- Other drinks (eg, lemonade, tea, juice drinks)

The following growth parameters were determined for each child at 72 months of age:

- Height
- Weight
- Body mass index (measured as kg/m^2)
- Ponderal index (measured as kg/m^3).

Statistical Analyses

- General Linear Models (to test the relationship between each growth parameter at 72 months of age and longitudinal juice intake) and Analysis of Variance.
- Adjusted for appropriate growth parameter (height) at 24 months, gender, longitudinal

energy intake and parents' heights (of BMI).

Data Collection Summary:

- *Dietary data:* Beverage intake, categorized as juice (100% juice only), milk, carbonated beverages and other drinks (seven sets of three-day dietary data, in-home interview, a 24-hour recall and two food records, including one weekend).
- *Height:* Measured
- *Weight:* Measured
- *BMI:* Calculated
- *Ponderal Index:* Proposed as a better measure of excess weight in growing children than BMI (calculated as kg/ms^3).

Description of Actual Data Sample:

- *Sample:* 72 (37 boys, 35 girls)
- *Age:* 24-72 months (two to six years)
- *Ethnicity:* White children
- *SES:* Mostly from middle to upper socioeconomic status families
- *Duration:* 1992-1999
- *Location:* Tennessee.

Summary of Results:

Fruit Juice and Obesity

- There were no statistically significant associations between longitudinal juice intake and children's height, weight or BMI (indicating longitudinal juice intake was not associated with overweight in young children). Beta coefficients were negative for juice in all models related to weight (weight, BMI, PI) and positive in the model for height.
- Children's longitudinal juice intake was negatively related to Ponderal Index (P=0.05).
- The children whose earliest 100% juice intake was highest also drank more other drinks at 72 months of age (P=0.04). However, the early high juice group had significantly lower BMI at 72 months of age than the group who had <12 ounces of juice at 27 or 34 months of age.

Trends

- Children's juice intake decreased significantly between the ages of two and six years (P<0.0001).
- Intake of carbonated beverages and other drink intake increased (P=0.0016).
- Overall mean daily beverage consumption did not change significantly over time.

Author Conclusion:

As children's juice intake decreased with increasing age, intakes of less nutritious beverages increased. While overweight measures were unaffected, the consequence of this change in beverage distribution is important, as beverages providing many nutrients are being replaced by ones containing fewer nutrients.

Reviewer Comments:

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	No
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A

3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	No
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A

6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	No

8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	No
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	No